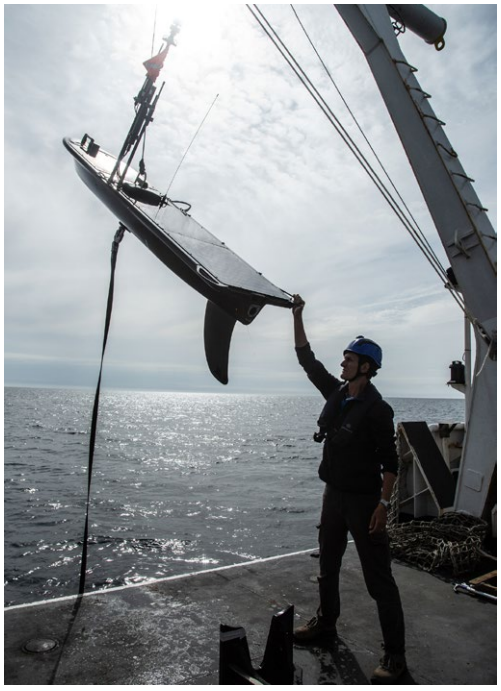
September 2022

Exercise REPMUS 22

REPMUS is a Portuguese-led exercise and focuses on capability development and interoperability. REPMUS stands for Robotic Experimentation and Prototyping with Maritime Unmanned Systems.

REPMUS 22 takes place from 12 – 22 September 2022.

The exercise has been held in the Portugal's Troia Bay since 2004. In 2014 the NATO Centre for Research and Experimentation (CMRE) joined REPMUS for the first time. Since 2019 the NATO Maritime Unmanned Systems Initiative (MUSI) has been playing a growing role in the exercise.



Wave Glider, an unmanned system operated by the NATO Centre for Maritime Research and Experimentation.

Participating nations in REPMUS 22

Portugal (host nation), Australia, Belgium, Canada, Denmark, France, Germany, Greece, Italy, the Netherlands, Poland, Romania, Spain, Türkiye, the United Kingdom and the United States.

In addition, several NATO and partner countries are sending observers.

Personnel involved

Approximately 900 civilian and military personnel are involved in the exercise. In addition, nearly 600 personnel are participating as part of the crews on the ships.

Participating multinational military commands and civilian institutions include:

- NATO Allied Command Transformation (ACT, United States)
- NATO Allied Maritime Command (MARCOM, United Kingdom)
- NATO Defence Investment Division (Brussels, Belgium)
- Maritime Unmanned Systems Innovation and Coordination Initiative (MUSI) (co-organiser)
- University of Porto (co-organiser, Portugal)
- The Centre for Maritime Research & Experimentation (CMRE, Italy)(co-organiser)
- The Naval Mine Warfare Centre of Excellence (NMW COE, Belgium) (MCM co-ordinator)
- Operations in Confined and Shallow waters Centre of Excellence (CSW COE, Germany)
- Combined Joint Operations from the Sea Centre of Excellence (CJOS COE, United States)
- Maritime GEOMETOC Centre of Excellence (GEOMETOC COE, Portugal)
- Defence Science and Technology Laboratory (DSTL, United Kingdom)
- Defence and Research Development (DRDC, Canada)
- Bundeswehr Technical Centre for Ships and Naval Weapons, Maritime Technology and Research (WDT 71, Germany)
- Organization for Applied Scientific Research (TNO, Netherlands)

The co-organiser MUSI is a multinational cooperation framework launched by NATO and partners in 2018 in order to pool resources and expertise to create better, more flexible and more interoperable unmanned maritime vehicles and systems.

Participants are Australia, Belgium, Canada, Denmark, France, Germany, Greece, Italy, Netherlands, Norway, Poland, Portugal, Romania, Spain, Türkiye, the United Kingdom and the United States. Estonia and partner nation Sweden have formal observer status.

Over 20 industries that support national navies and the host nation are also participating in the exercise.

Warships involved include:

- France: Offshore Patrol Vessel (OPV) DUCUING
- The Netherlands: HNLMS ROTTERDAM (Amphibious Warfare Ship)
- Portugal: NRP BARTOLOMEU DIAS (Frigate)
- Portugal: Offshore Patrol Vessel (OPV) NRP VIANA DO CASTELO

- Portugal: Offshore Patrol Vessel (OPV) NRP SINES
- Portugal: Fast Patrol Boat (FPB) NRP HIDRA
- Portugal: Fast Patrol Boat (FPB) NRP SAGITÁRIO
- Portugal: NRP ARPÃO (Submarine)
- Spain: Offshore Patrol Vessel (OPV) AUDAZ
- United Kingdom: HMS HURWORTH (Minehunter)
- United Kingdom: HMS LANCASTER (Frigate)

Trials Ships include:

- CMRE: NRV ALLIANCE (Trials ship)
- Germany: PLANET (Trials ship)
- Netherlands: GEOSEA (Trials ship)
- Portugal: NRP GAGO COUTINHO (Hydrographic Survey Ship)
- Portugal: NRP DOM CARLOS I (Hydrographic Survey Ship)
- Romania: Alexandru CĂTUNEANU (Hydrographic Survey Ship)

Assets involved in REPMUS

Participating nations are providing surface, underwater and air vehicles for coastal maritime operations and for maritime operations based on ships at sea. These include unmanned underwater, surface and aerial systems.

The NATO CMRE and the University of Porto are also providing unmanned surface and underwater systems.

In total REPMUS 22 gathers:

- Approximately 40 Unmanned Underwater Vehicles;
- Approximately 18 Unmanned Surface Vehicles;
- Approximately 45 Unmanned Air Vehicles.

Live Testing during REPMUS 22 in the areas of Troia, Sado River and offshore from the Troia Peninsula includes:

- **Maritime Interoperability testing and capability development (platforms and sensor systems) are the focus of activity at Troia**. The testing is based around a common Unmanned Systems Command & Control network, allowing allied unmanned vehicles from different nations to work with already existing manned platforms, above, on and below the water.

  All this is coordinated together from the combined Maritime Operations Centre (MOC) at Troia. This coordination is tested in a number of fictitious warfighting scenarios, to achieve specific objectives such as Maritime Surveillance, Intelligence collection, Interdiction, Force Protection, Amphibious Operations and Anti-Submarine Warfare.
- **Rapid Environmental Assessment under, on and above the water**. The testing aims to provide a 24/7 real time feed of oceanographic and meteorological data to the command, enabling a full understanding of the maritime operating environment and how it is changing over time. Data is fed into the Maritime Operations Centre in Troia and into a Command Centre in Lisbon.
- **Specific Anti-Submarine Warfare (ASW) experimentation**. The testing takes place further offshore and is designed to build the capabilities for a multinational unmanned ASW barrier concept (A flagship NATO Smart Defence Project).
- **Mine Countermeasures (MCM)**. Testing takes place in a series of dedicated mine warfare areas off the port of Sesimbra, where a Mine Countermeasures Operations Centre is established.

  This is the first time so many new unmanned MCM systems are brought together in an Allied context on this scale. Unmanned MCM systems are rapidly maturing and beginning to enter service. The focus of this work is around mine hunting and clearance operations against pre-laid target mines, while keeping personnel out of the danger area. This builds the interoperability of different allied unmanned toolboxes operating as a combined force.

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